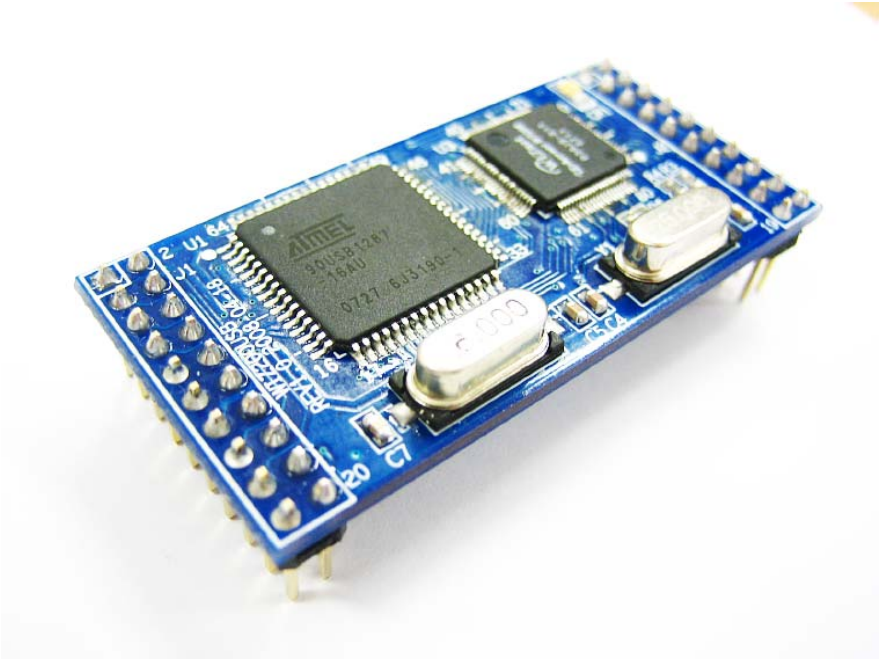
WIZ-iStorage User Manual

(Ver. 1.0)



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Document History Information

Revision	Data	Description
Ver. 1.0	2008. 05. 30	Release with WIZ-iStorage launching

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Table of Contents

1. Overview 6
1.1. Main Functions 6
1.2. Products Specification 7
1.3. Products Contents (WIZ-iStorage- EVB) 7
2. Block Diagram 9
3. WIZ-iStorage Base Board 9
4. How to Test WIZ-iStorage 13
4.1. Configuration Tool 13
4.2. Operation Test 16
5. Programmer's Guide 19
5.1. Memory Map 19
5.2. WIZ-iStorage Firmware 19
5.3. Compile 21
5.4. Download 22
6. WIZ-iStorage Hardware Specification 24
6.1. Parameters 24
6.2. Specification 24
6.3. Board Dimensions and Pin Assignment 24
7. Warranty 30

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Tables

Table 1. Products Specification 7
Table 2. WIZ-iStorage EVB Contents 8
Table 3. Power Supply through USB A-Type 10
Table 4. WIZ-iStorage Testing Environment 17
Table 5. WIZ-iStorage Main Source 20
Table 6. WIZ-iStorage PINMAP 26

Figures

Figure 1. Block Diagram 9
Figure 2. WIZ-iStorage Base Board 10
Figure 3. WIZ-iStorage PIN MAP 11
Figure 4. WIZ-iStorage LED 11
Figure 5. WIZ-iStorage Switch 12
Figure 6. Configuration Tool Program 13
Figure 7. Board Search Window 15
Figure 8. Open Dialog Box for Uploading 16
Figure 9. Firmware Uploading Window 16
Figure 10. Complete Uploading 16
Figure 11. WIZ-iStorage External Interface 17
Figure 12. USB to Ethernet Function Test 18
Figure 13. WIZ-iStorage Memory Map 19
Figure 14. AVR Studio 21
Figure 15. AT90USB ISP Fuses Setting 22
Figure 16. WIZ-iStorage Boot Loader Program 23
Figure 17. WIZ-iStorage PIN Map 24
Figure 18. WIZ-iStorage Board Dimension 27
Figure 20. USB PIN Assignment 28
Figure 19. RJ-45 PIN Assignment 28
Figure 21. RS-232 PIN Assignment 29

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1. Overview

WIZ-iStorage is a USB-to-Ethernet converting module that enables data to be transmitted from a USB Mass Storage device over Ethernet. WIZ-iStorage operates as FTP server. Therefore, it is possible to read or write the data to USB Mass Storage by using FTP client Program.

1.1. Main Functions

- Operates as FTP Server
- Supports USB Mass Storage Host
- Easy & fast Ethernet Implementation to USB Mass Storage Device.
- Guaranteed system stability and reliability using W5100 hard-wired chip
- Supported by Configuration Tool Program for easy configuration and control
- Supports 10/100 Mbps Ethernet Interface
- Supports USB2.0
- RoHS Compliant

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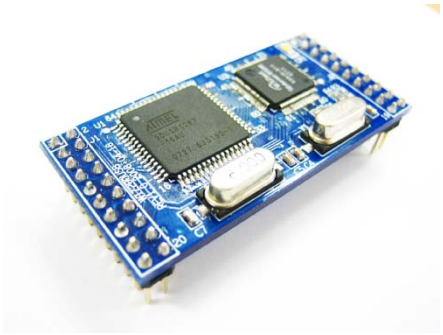
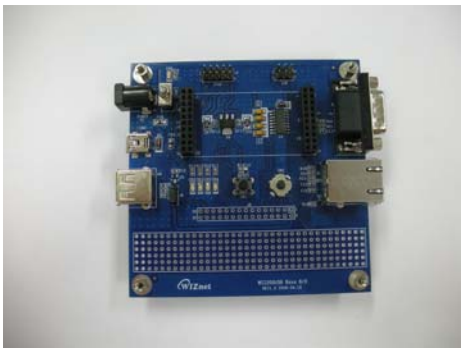
1.2. Products Specification

ITEMs	Description
MCU	AVR compliant – AT90USB1287 (having internal 128K Flash, 8K SRAM, 4K EEPROM)
Protocols	TCP/IP - W5100 (Ethernet MAC & PHY Embedded) UDP – Configuration FTP Server – File Transfer DHCP
Network Interface	10/100 Mbps Auto-sensing, RJ-45 Connector
USB Interface	USB2.0 Full Speed Host
Input Voltage	DC 5V
Power Consumption	Under 180mA
Temperature	0°C ~ 80°C (Operation), -40°C ~ 85°C (Storage)
Humidity	10 ~ 90%

Table 1. Products Specification

1.3. Products Contents (WIZ-iStorage- EVB)

	WIZ-iStorage Module
	WIZ-iStroage Base Board

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	CD (including Configuration Tool Program, Firmware, Manual and other related Materials)
	LAN Cable
	5V Power Adaptor

Table 2. WIZ-iStorage EVB Contents

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2. Block Diagram

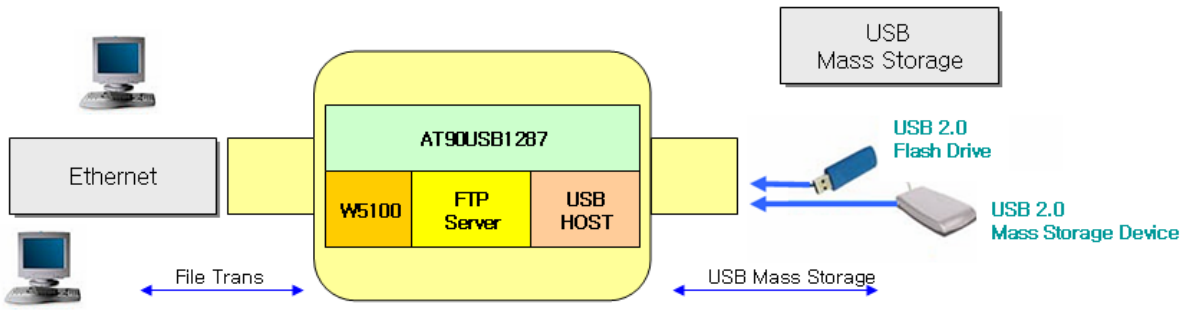

Figure 1. Block Diagram

WIZ-iStorage board accesses mass storage devices by operating as a USB host. Operating as an FTP server, it enables FTP client program, which is connected through Ethernet, to read and write the data to the USB device. If you use an FTP client program to connect to WIZ-iStorage device, it is possible to read or save the files to a mass storage device.

3. WIZ-iStorage Base Board

WIZ-iStorage Base Board is the testing board of WIZ-iStorage module.

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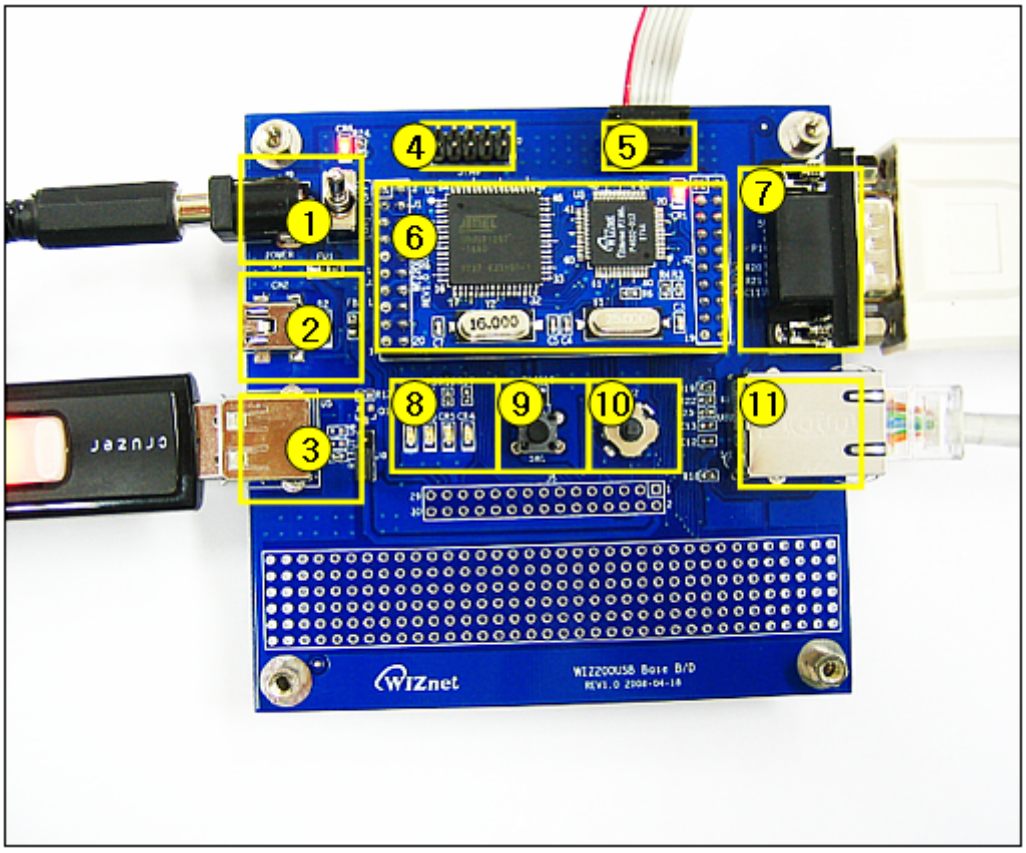

Figure 2. WIZ-iStorage Base Board

① Power

DC 5V (500mA or above) adaptor is connected to the board. By using power switch, it is possible to turn on or off the board.

② USB Mini Connector

When testing the board as USB device mode, USB Mini Connector is used. Not recommended for Host Mode testing.

③ USB A-type Connector

When testing the board as USB host mode, A-type connector is used. In order to supply the power to the USB device, J8 is used. If you connect to J8 1-2, the power is supplied to the device, and connect to J82-3, the power is supplied through software by using MCU GPIO (UVCON). J8 1-2 is the factory default.

J8 1-2	Power is supplied to the device
J8 2-3	Power is supplied through GPIO(UVCON)

Table 3. Power Supply through USB A-Type

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④ At90USB1287 JTAG Connector

⑤ At90USB1287 ISP Connector

⑥ WIZ-iStorage Connector

The pin map of WIZ-iStorage is as below.

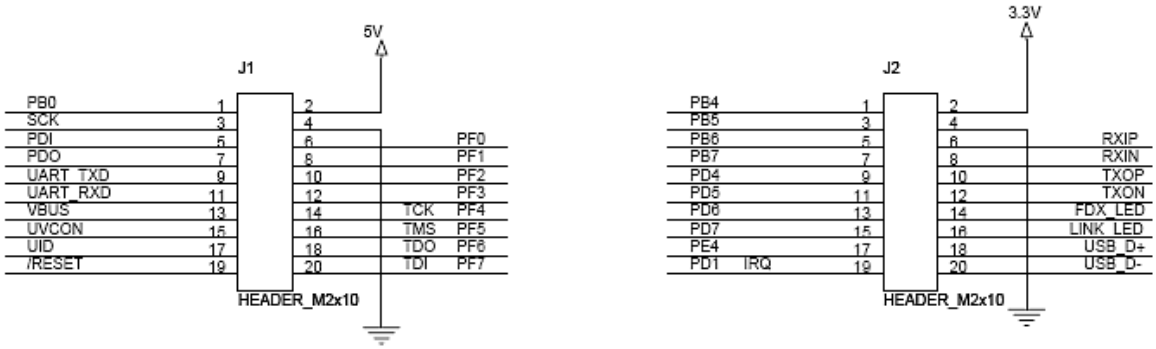

Figure 3. WIZ-iStorage PIN MAP

⑦ Serial Connector

Debugging information is transmitted through serial port during development.

⑧ LED

In the WIZ-iStorage Base Board, 4 LEDs are connected to PortB.4~7.

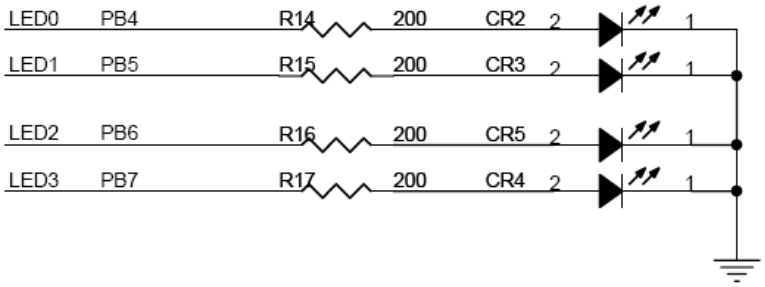

Figure 4. WIZ-iStorage LED

⑨ System Reset Switch

⑩ Joystick

Switch is connected to PORTF.0~3. It should be configured as internal pull-up at the MCU.

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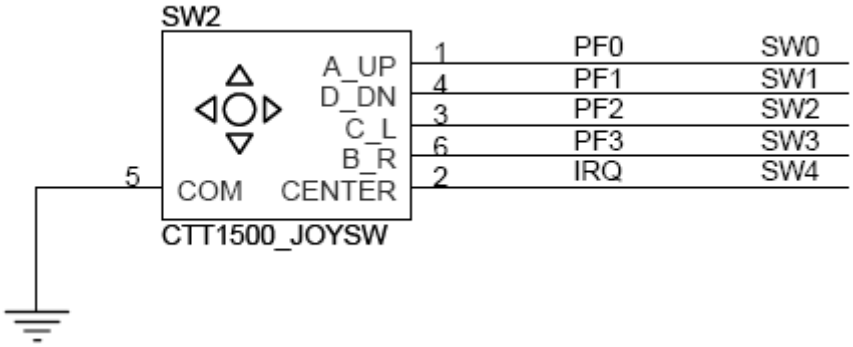

Figure 5. WIZ-iStorage Switch

⑪ Ethernet Connector

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4. How to Test WIZ-iStorage

4.1. Configuration Tool

4.1.1. Configuration Tool Program

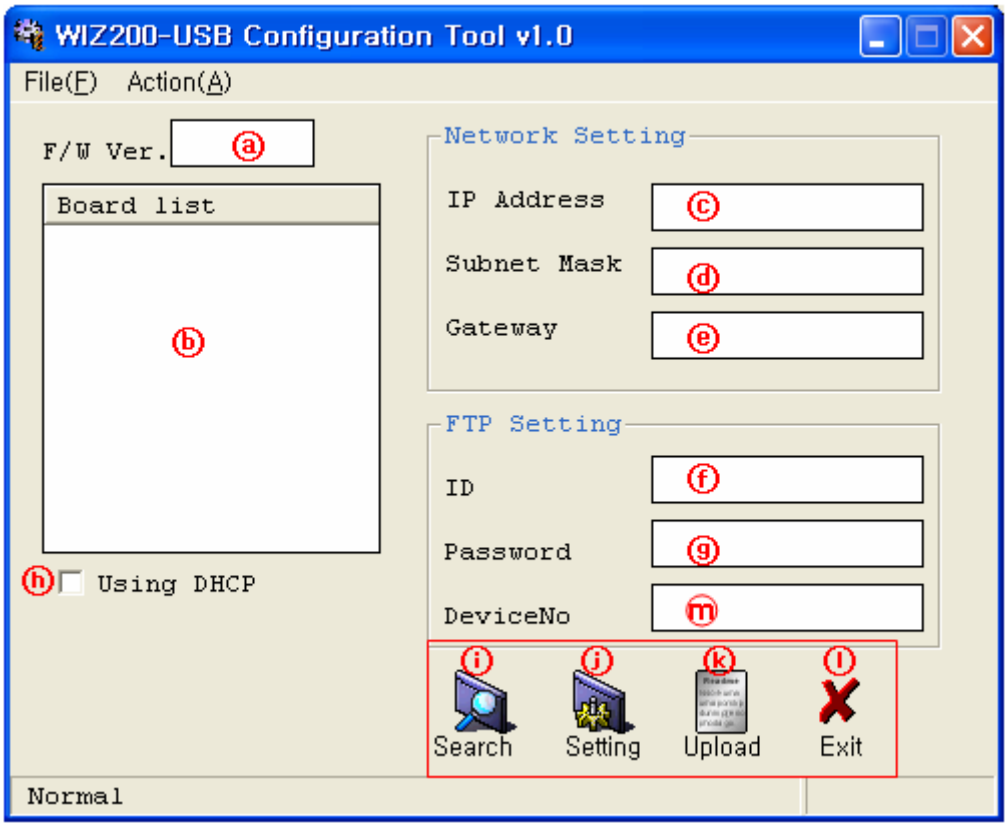

Figure 6. Configuration Tool Program

ⓐ Version : Firmware version is displayed.

ⓑ Board List : If "Search" button is clicked, the MAC address of the module on the same subnet is displayed.

ⓒ Local IP/Port : The IP address and port number of WIZ-iStorage should be input for the connection.

ⓓ Subnet : WIZ-iStorage의 Subnet Mask

ⓔ Gateway : WIZ-iStorage의 Gateway Address

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ⓕ ⓖ Id, Password : The ID and Password for the FTP connection are input. In case of client or mixed mode, user should manually set the server IP address. After setting is completed, WIZ-iStorage tries to connect to the IP address.

ⓗ Enable DHCP Mode : It is the option for the DHCP mode. If you select the module at the 'board list' and click 'Enable DHCP mode' and 'Setting' button, the module acquires IP and Subnet from DHCP server. After acquiring network information from DHCP server, re-boot is processed. If you click 'Search' button, the network information acquired from DHCP server, is displayed. If the board fails to get the network information from DHCP server, IP, Subnet, Gateway is initialized with the default value of 0.0.0.0

ⓘ Search : 'Search' is used for searching modules on same LAN by using UDP broadcast. If modules are searched, their MAC addresses are displayed on the 'Board list'

ⓙ Setting

'Setting' is used for completing the change of configuration value of WIZ-iStorage. After changing any configuration value of the module, you should click 'Setting' button. The changed value is saved in the EEPROM. So that, even though power is off, the configuration value can be kept.

Changing process is as below.

① Select a module on the 'Board list'. Each configuration value of the selected module is displayed in the field Configuration Tool program.
② Change any value in the field.
③ Click "Setting" button to complete the configuration change.
④ Module is initialized with changed value (module is automatically re-booted)
⑤ In order to check changed value, search the module by clicking "Search" button.

ⓚ Upload

This is for uploading the firmware through network.

Firmware uploading process is described in the chapter of "4.1.2. Firmware Uploading".

☞ It takes about 20 ~ 30 seconds to initialize the module after firmware uploading.

ⓛ Exit : Close the Configuration tool program.

ⓜ DeviceNo:

This is for device selection when multi USB devices are connected. If one device is connected, input '0'.

4.1.2. Firmware Uploading

① Execute WIZ-iStorage Configuration Tool program, and click 'Search' button.

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② If a module is normally connected to the network, the MAC address of the module is displayed on the 'Board list' as shown below.

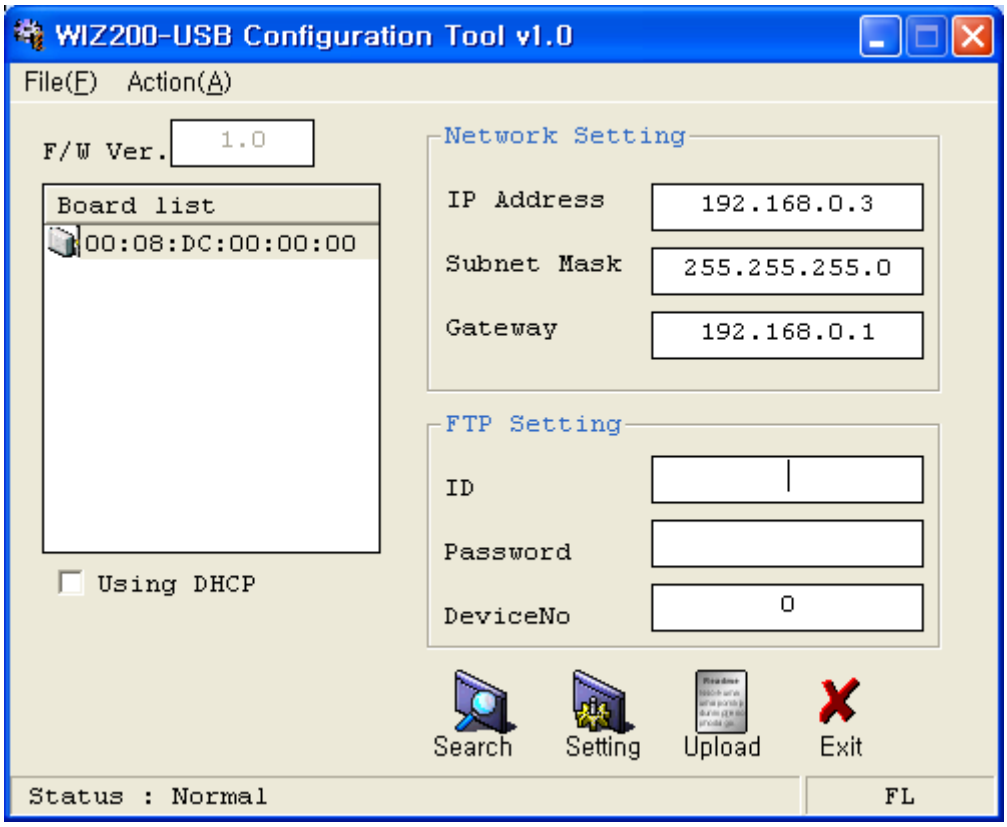

Figure 7. Board Search Window

③ Select a module on the 'Board list', and click 'Upload' button.

☞ **Before uploading through Ethernet, check if all network information is correctly configured by sending 'PING' command.**

④ If below screen is appeared, select the binary file for uploading and click 'open' button.

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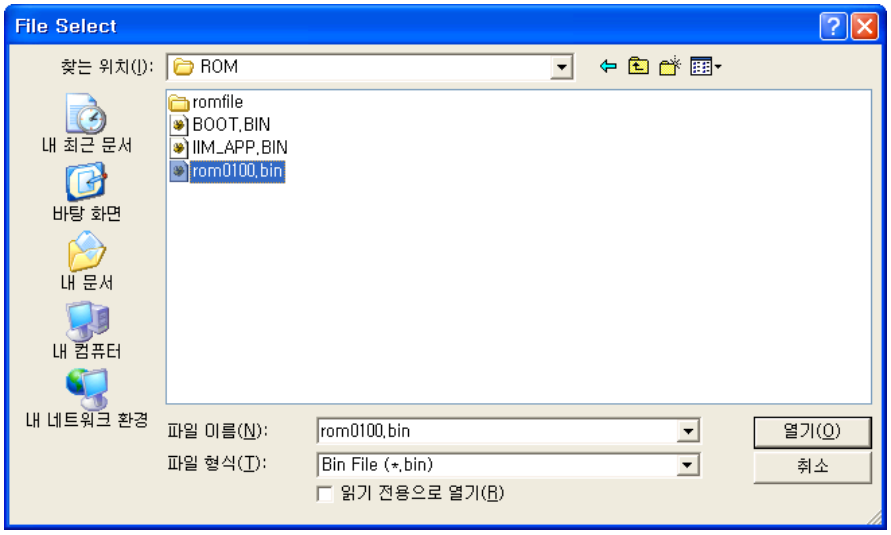

Figure 8. Open Dialog Box for Uploading

☞ **Do not upload any other file except for firmware of WIZ-iStorage.**

⑤ The status window below should be seen.

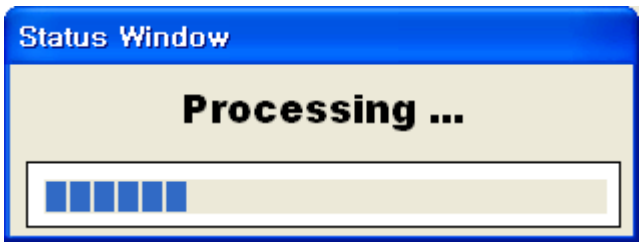

Figure 9. Firmware Uploading Window

⑥ If file uploading is completed, below "Complete Uploading" message is shown.

Figure 10. Complete Uploading

4.2. Operation Test

In this chapter, we will proceed the test to check how WIZ-iStorage operate. The requirement of hardware and software for the testing is as below.

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	PC	WIZ-iStorage
Hardware	1) LAN Port	1) WIZ-iStorage Board 2) LAN Cable 3) USB Mass Storage Device(USB Memory Stick) 4) DC5V Power Adaptor
Software	1) Configuration Tool Program 2) FTP Client Program	

Table 4. WIZ-iStorage Testing Environment

4.2.1. Hardware Interface

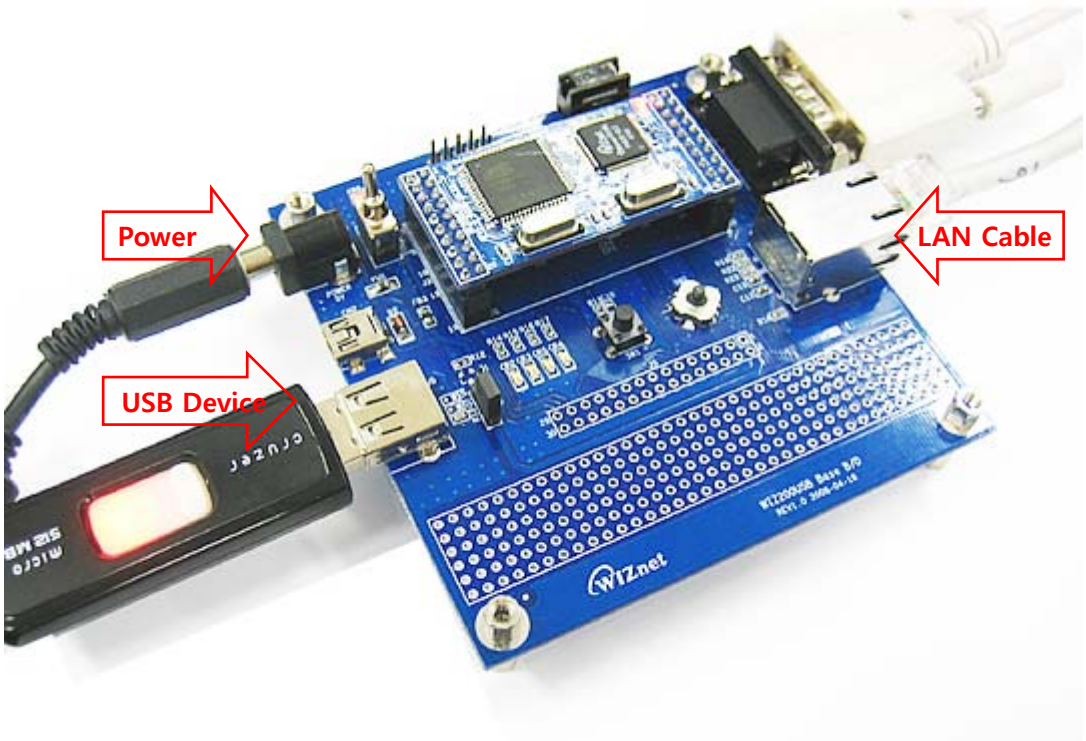

Figure 11. WIZ-iStorage External Interface

The hardware installation can be processed as below.

STEP 1: Connect the board to the network by using RJ45 Ethernet cable.

STEP 2: Connect the USB memory stick to the WIZ-iStorage board.

STEP 3: Connect the 5V DC adaptor to the WIZ-iStorage board.

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4.2.2. USB to Ethernet Function Test

STEP1: Connect the power to the WIZ-iStorage board.

STEP2: Configure the board by using Configuration Tool program.

STEP3: Execute FTP Client program to connect to the WIZ-iStorage.

STEP4: If connection is normally processed, you can check files of USB memory stick through FTP Client program.

STEP5: You can test copying or downloading files at the FTP Client program.

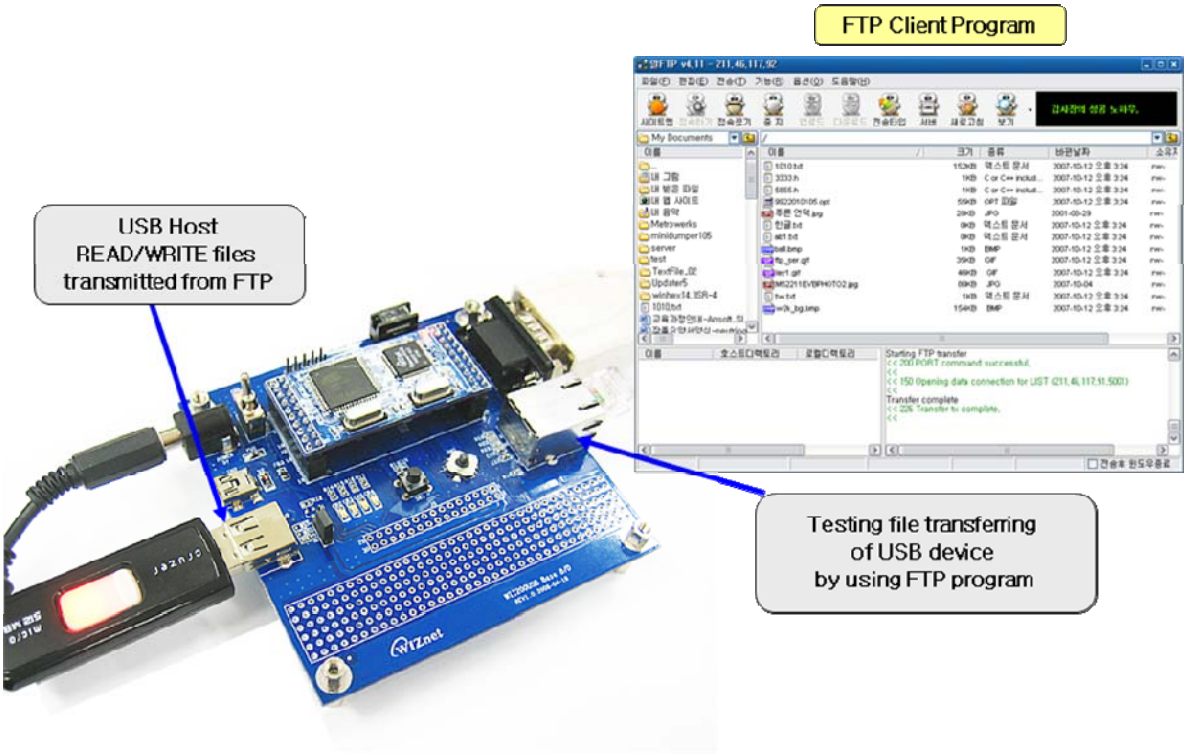

Figure 12. USB to Ethernet Function Test

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5. Programmer's Guide

5.1. Memory Map

The memory map of WIZ-iStorage is composed of 128Kbyte code memory and 64Kbyte data memory. Data memory is divided into internal SRAM and W5100 field. Together with them, 4Kbyte EEPROM is included in the AVR for saving all environmental variables.

<Figure 9> shows system memory map of the test board.

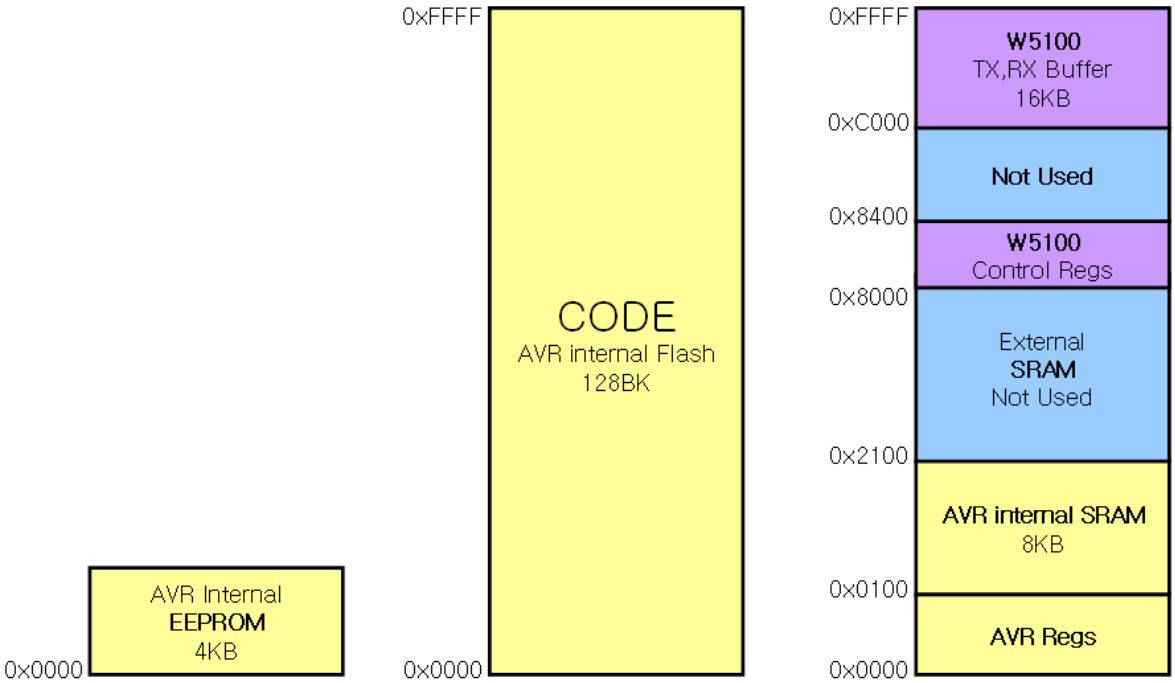

Figure 13. WIZ-iStorage Memory Map

5.2. WIZ-iStorage Firmware

The first Function, 'main()' calls usb_task, host_ms_task, ftp_task, config_task and dhcp_task in sequence in the while loop by using scheduler_tasks()

Each task is defined in the 'common₩modules₩sheduler₩conf_scheduler.h'. The role of each task is as below

- usb_task : to process the USB
- host_ms_task : to process the USB Host and Memory Stick
- ftp_task : to process FTP server
- config_task : to process network
- dhcp_task : to process DHCP

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The Function of 'host_ms_task()' of [host_ms_task.c] file watches the connection of USB device and prepares the communication with USB device by detecting it.
The Function of 'dhcp_task()' of [dhcp_task.c] file acquires network information from DHCP server.
The Function of 'ftp_task()' of [ftp_task.c] file operates as FTP server. According to the requirement from FTP Client, it transmits the file of USB device and saves received data.
The Function of 'config_task()' of [config_task.c] file modifies network information or processes the firmware uploading through Configuration program.

Path and Folder Name	File	Function
common₩modules₩scheduler	scheduler.h, scheduler.c	Task Initialization
conf	config.h	Task Definition & Initialization Set-up
lib_system₩iinchip	iinchip_conf.h	System Dependant Definition of W5100
	types.h	AVR Data Type & Global Definition
	w5100.c	w5100 I/O Function
	socket.c	w5100 Socket API
	dchp.c	DHCP Client Protocol
lib_system₩evb	evb.h, evb.c	Board Initialization & Swich and LED Control Function
main	main.c	EVB B/D F/W main()
	host_ms_task.c	Detecting & Processing the USB Mass Storage
	ftp_task.c	FTP Server Management
	config_task.c	Net Configuration Task
	dhcp_task.c	DHCP Client Management
modules₩proc	ftpd.h , ftpd.c	ftp server Process
	proc_ms.h , proc_ms.c	Control and process of USB MassStorage Device

Table 5. WIZ-iStorage Main Source

Refer to 'USB Software Library for AT90USBxxx Microcontrollers (doc7675.pdf)' for the detailed information.

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5.3. Compile

The sources of Chapter 5.2 are compiled in a batch by arranging them in a row.
The firmware of WIZ-iStorage can be compiled through WINAVR and AVRSTUDIO.
Install WINAVR and AVRSTUDIO on the PC. For easier compile, open "~/sw/fw/WIZ-iStorage.aps" file through AVRSTUDIO project file. Check the compile setting at the Configuration option of AVRSTUDIO project menu. For the detail, refer to 'AVR Studio User Guide'
The firmware provided by WIZnet is based on AVR-GCC 3.4.6. In another version, we can not guarantee normal operation.

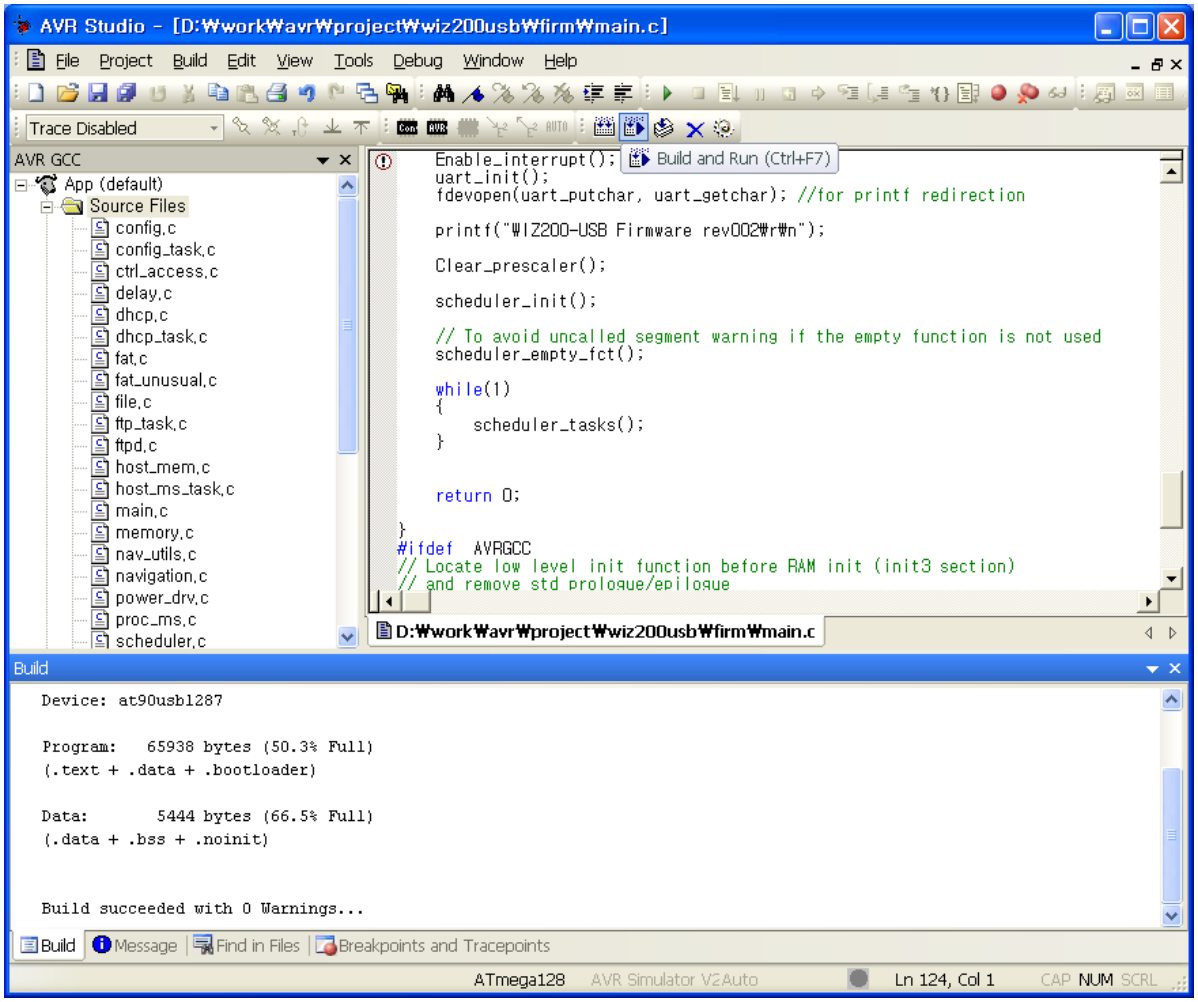

Figure 14. AVR Studio

When compile is completed, 'hex' file is created in the folder that user designated earlier. This file is programmed to the At90USB1287

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5.4. Download

In order to download the 'hex' file, AVR Studio and AVRISP cable is used.

1) Connect AVRISP cable to the J7 of WIZ-iStorage Base Board.
2) Connect the power and turn on the switch.
3) Execute AVRStudio.exe.
4) Select AT90USB1287 at the Device section.
5) Select 'hex' file at the FLASH section.
6) Click 'Program' button.

For the detail, refer to 'AVR Tool Guide.pdf'.

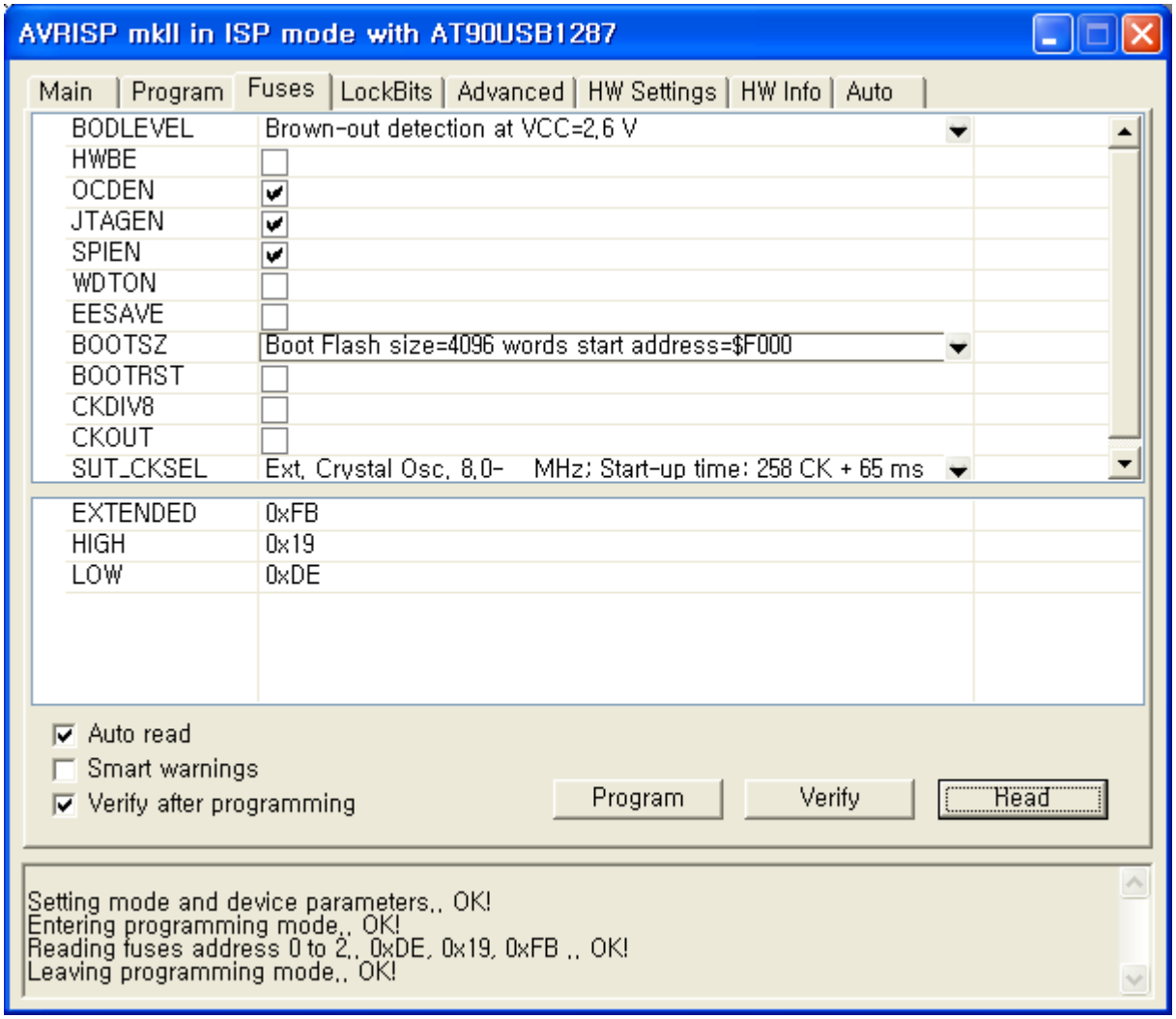

Figure 15. AT90USB ISP Fuses Setting

For firmware updates through a network, program the boot loader first. The boot loader is made to be written at the 0x1e000. Remove the AT90USB1287 first, and program the 'Boot.hex' file and re-program the firmware file. At this time, do not check the option "Erase Device Before

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Programming" to prevent the removal of boot loader.

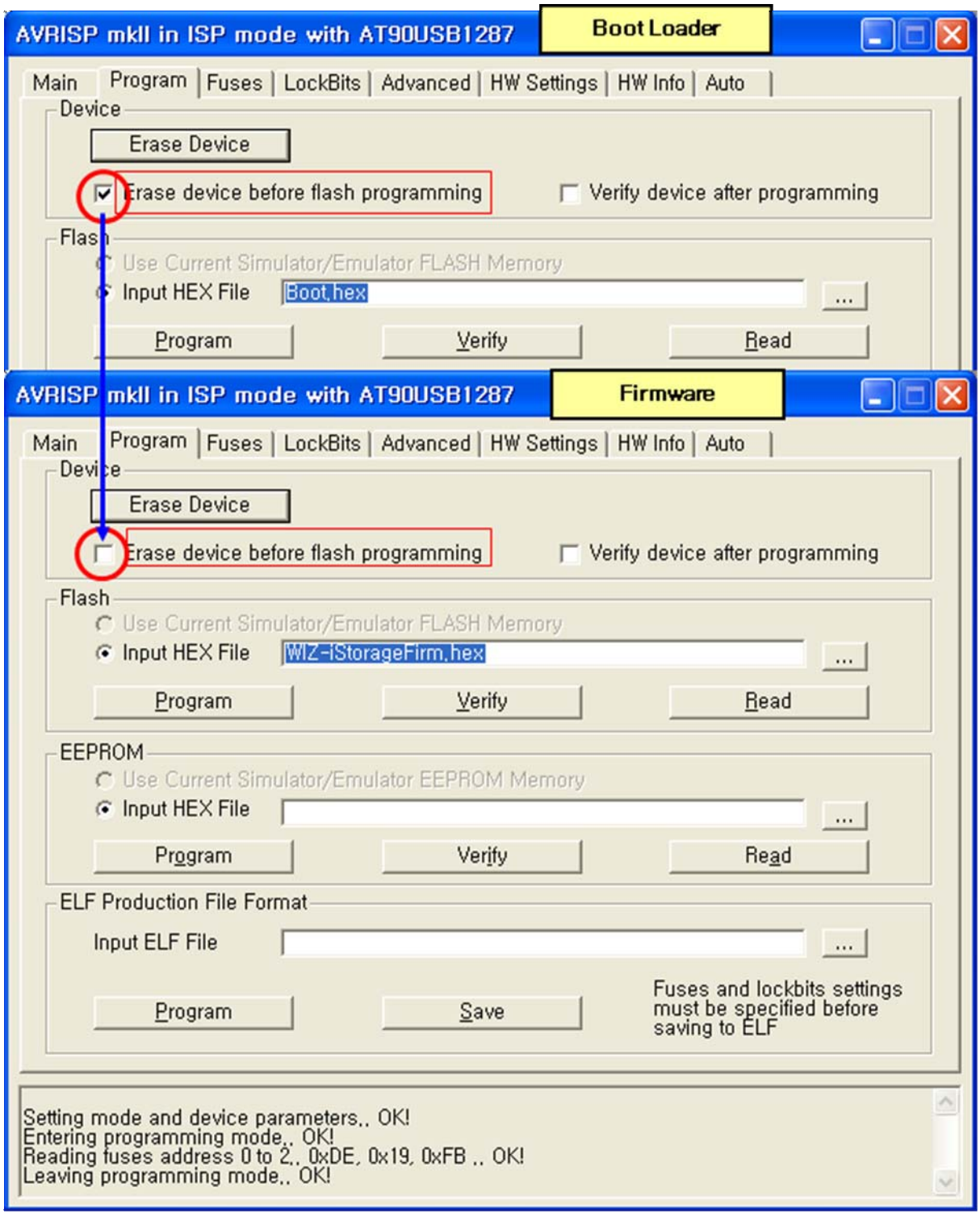

Figure 16. WIZ-iStorage Boot Loader Program

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6. WIZ-iStorage Hardware Specification

6.1. Parameters

- Power 5V DC,3.3V / 160mA
- Dimension 54 x 26 x 14 (L x W x H)
- Temperature Operating : 0 ~ 80 ℃
- Ethernet 10/100 Base-T Ethernet (Auto detection)
- USB interface USB2.0 Full Speed

6.2. Specification

- MCU At90USB1287
- FLASH 128KByte (MCU Internal)
- SRAM 8KByte (MCU Internal)
- EEPROM 4KByte (MCU Internal)

6.3. Board Dimensions and Pin Assignment

6.3.1. PIN Assignment

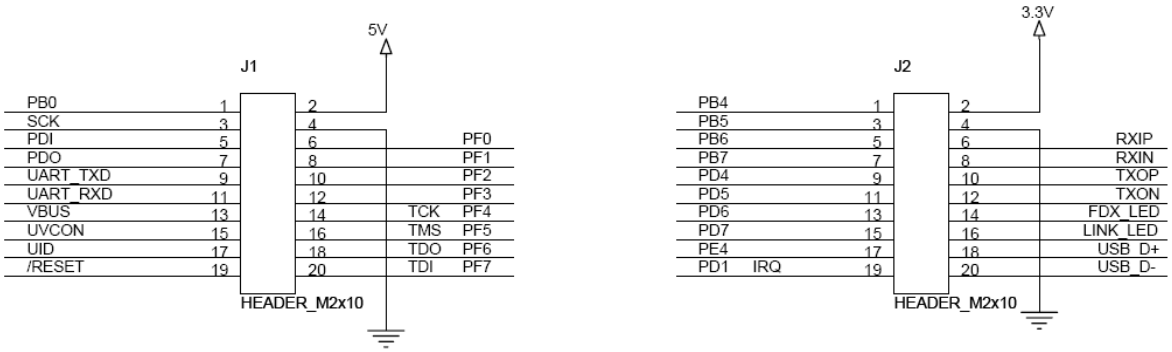

Figure 17. WIZ-iStorage PIN Map

NO	PIN NAME	기능	I/O	
J1-1	PB0	GPIO	Input/Output	
J1-3	SCK	SPI SCK, GPIO, ISP	Input/Output	
J1-5	PDI	SPI MOSI, GPIO, ISP	Input/Output	
J1-7	PDO	SPI MISO, GPIO, ISP	Input/Output	
J1-9	UART_TXD	RS-232 Data Output	Output	
J1-11	UART_RXD	RS-232 Data Input	Input	

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J1-13	VBUS	USB VBUS monitor and OTG negotiations.	Input	
J1-15	UVCON	USB Connect/Disconnect, GPIO	Input/Output	Optional
J1-17	UID	USB ID Detector	Input	Optional
J1-19	/RESET	System RESET	Input	Optional
J1-2	5V	5V POWER(MCU POWER)	Input	Optional
J1-4	GND	POWER GROUND	Input	
J1-6	PF0	GPIO, ADC0	Input/Output	
J1-8	PF1	GPIO, ADC1	Input/Output	
J1-10	PF2	GPIO, ADC2	Input/Output	
J1-12	PF3	GPIO, ADC3	Input/Output	
J1-14	PF4	GPIO, ADC5, JTAG(TCK)	Input/Output	
J1-16	PF5	GPIO, ADC6, JTAG(TMS)	Input/Output	
J1-18	PF6	GPIO, ADC7, JTAG(TDO)	Input/Output	
J1-20	PF7	GPIO, ADC8, JTAG(TDI)	Input/Output	
J2-1	PB4	GPIO, INT4, OC2A	Input/Output	
J2-3	PB5	GPIO, INT5, OC1A	Input/Output	
J2-5	PB6	GPIO, INT6, OC1B	Input/Output	
J2-7	PB7	GPIO, INT7, OC0A, OC1C	Input/Output	
J2-9	PD4	GPIO, IPC1	Input/Output	
J2-11	PD5	GPIO, XCK1	Input/Output	
J2-13	PD6	GPIO, T1	Input/Output	
J2-15	PD7	GPIO, T0	Input/Output	

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J2-17	PE4	GPIO, INT4	Input/Output	
J2-19	PD1	GPIO, INT1	Input/Output	
J2-2	3.3V	3.3V POWER(W5100 POWER)	Input	
J2-4	GND	GND	Input	
J2-6	TPRX-	Ethernet Differential Input-	Input	
J2-8	TPRX+	Ethernet Differential Input+	Input	
J2-10	TPTX-	Ethernet Differential Output-	Output	
J2-12	TPTX+	Ethernet Differential Output+	Output	
J2-14	LINK_LED	Link LED	Output	
J2-16	FDX_LED	FULL DUFLEX LED	Output	
J2-18	USB_D+	USB Positive Data Upstream Port.	Output	
J2-20	USB_D-	USB Negative Data Upstream Port.	Output	

Table 6. WIZ-iStorage PINMAP

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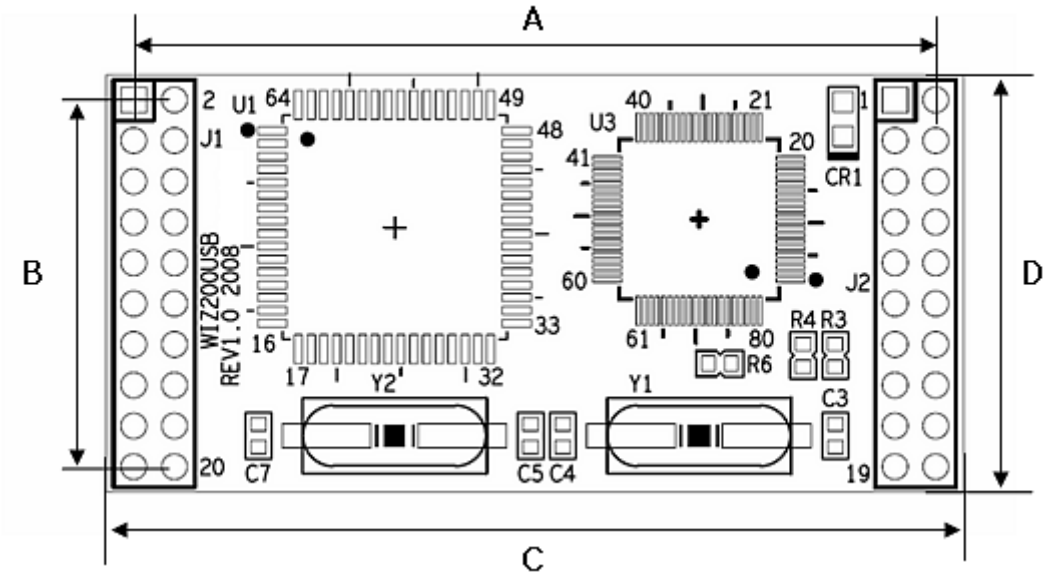
6.3.2. Dimensions



A	50.8mm
B	22.86mm
C	54mm
D	26mm

Figure 18. WIZ-iStorage Board Dimension

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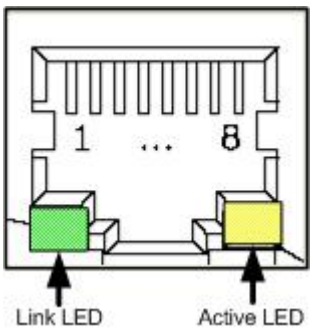
6.3.3. Connector Specification

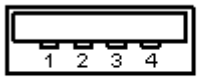
RJ45 : Ethernet Port Pinouts



Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-

Figure 19. RJ-45 PIN Assignment

USB



Type A USB Connector

Type B USB Connector

Pin Number	Signal	Description
1	Vbus	Power 5V
2	D-	Data-
3	D+	Data+
4	GND	Ground

Figure 20. USB PIN Assignment

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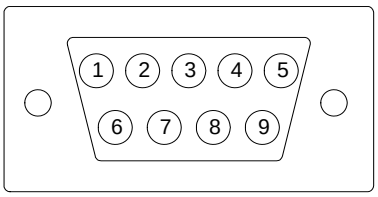
RS-232



Pin Number	Signal	Description
1	NC	Not Connected
2	RxD	Receive Data
3	TxD	Transmit Data
4	NC	Not Connected
5	GND	Ground
6	NC	Not Connected
7	NC	Not Connected
8	NC	Not Connected
9	NC	Not Connected

Figure 21. RS-232 PIN Assignment

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7. Warranty

WIZnet Co., Ltd offers the following limited warranties applicable only to the original purchaser. This offer is non-transferable.

WIZnet warrants our products and its parts against defects in materials and workmanship under normal use for period of standard ONE(1) YEAR for the WIZ-iStorage board and labor warranty after the date of original retail purchase. During this period, WIZnet will repair or replace a defective products or part free of charge.

Warranty Conditions:

The warranty applies only to products distributed by WIZnet or our official distributors.

1. The warranty applies only to defects in material or workmanship as mentioned above in 7. Warranty.
2. The warranty applies only to defects which occur during normal use and does not extend to damage to products or parts which results from alternation, repair, modification, faulty installation or service by anyone other than someone authorized by WIZnet Inc. ; damage to products or parts caused by accident, abuse, or misuse, poor maintenance, mishandling, misapplication, or used in violation of instructions furnished by us ; damage occurring in shipment or any damage caused by an act of God, such as lightening or line surge.

Procedure for Obtaining Warranty Service

1. Contact an authorized distributors or dealer of WIZnet Inc. for obtaining an RMA (Return Merchandise Authorization) request form within the applicable warranty period.
2. Send the products to the distributors or dealers together with the completed RMA request form. All products returned for warranty must be carefully repackaged in the original packing materials.
3. Any service issue, please contact to sales@wiznet.co.kr

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